

What Is Blockchain?



David Rodeck, Benjamin Curry

Contributor, Editor

Updated: Apr 28, 2022, 1:16pm

Editorial Note: We earn a commission from partner links on Forbes Advisor. Commissions do not affect our editors' opinions or evaluations.



Getty

Blockchain is the innovative database technology that's at the heart of nearly all cryptocurrencies. By distributing identical copies of a database across an entire network, blockchain makes it very difficult to hack or cheat the system. While cryptocurrency is the most popular use for blockchain presently, the technology offers the potential to serve a very wide range of applications.

What Is Blockchain?

At its core, blockchain is a distributed digital ledger that stores data of any kind. A blockchain can record information about [cryptocurrency](#) transactions, [NFT](#) ownership or [DeFi](#) smart contracts. While any conventional database can store this sort of information, blockchain is unique in that it's totally decentralized. Rather than being maintained in one location, by a centralized administrator—think of an Excel spreadsheet or a bank database—many identical copies of a blockchain database are held on multiple computers spread out across a network. These individual computers are referred to as nodes.

How Does Blockchain Work?

The name blockchain is hardly accidental: The digital ledger is often described as a “chain” that’s made up of individual “blocks” of data. As fresh data is periodically added to the network, a new “block” is created and attached to the “chain.” This involves all nodes updating their version of the blockchain ledger to be identical.

How these new blocks are created is key to why blockchain is considered highly secure. A majority of nodes must verify and confirm the legitimacy of the new data before a new block can be added to the ledger. For a cryptocurrency, they might involve ensuring that new transactions in a block were not fraudulent, or that coins had not been spent more than once. This is different from a standalone database or spreadsheet, where one person can make changes without oversight.

“Once there is consensus, the block is added to the chain and the underlying transactions are recorded in the distributed ledger,” says C. Neil Gray, partner in the fintech practice areas at Duane Morris LLP. “Blocks are securely linked

together, forming a secure digital chain from the beginning of the ledger to the present.”

Transactions are typically secured using cryptography, meaning the nodes need to solve complex mathematical equations to process a transaction.

“As a reward for their efforts in validating changes to the shared data, nodes are typically rewarded with new amounts of the blockchain’s native currency—e.g., new bitcoin on the bitcoin blockchain,” says Sarah Shtylman, fintech and blockchain counsel with Perkins Coie.

Public Blockchains vs Private Blockchains

There are both public and private blockchains. In a public blockchain, anyone can participate meaning they can read, write or audit the data on the blockchain. Notably, it is very difficult to alter transactions logged in a public blockchain as no single authority controls the nodes.

A private blockchain, meanwhile, is controlled by an organization or group. Only it can decide who is invited to the system plus it has the authority to go back and alter the blockchain. This private blockchain process is more similar to an in-house data storage system except spread over multiple nodes to increase security.

How Is Blockchain Used?

Blockchain technology is used for many different purposes, from providing financial services to administering voting systems.

Cryptocurrency

The most common use of blockchain today is as the backbone of cryptocurrencies, like [Bitcoin](#) or [Ethereum](#). When people buy, exchange or

spend cryptocurrency, the transactions are recorded on a blockchain. The more people use cryptocurrency, the more widespread blockchain could become.

“Because cryptocurrencies are volatile, they are not yet used much to purchase goods and services. But that is changing as PayPal, Square and other money service businesses make digital asset services broadly available to vendors and retail customers,” notes Patrick Daugherty, senior partner of Foley & Lardner and lead of the firm’s blockchain task force.

Banking

Beyond cryptocurrency, blockchain is being used to process transactions in fiat currency, like dollars and euros. This could be faster than sending money through a bank or other financial institution as the transactions can be verified more quickly and processed outside of normal business hours.

Asset Transfers

Blockchain can also be used to record and transfer the ownership of different assets. This is currently very popular with digital assets like NFTs, a representation of ownership of digital art and videos.

However, blockchain could also be used to process the ownership of real-life assets, like the deed to real estate and vehicles. The two sides of a party would first use the blockchain to verify that one owns the property and the other has the money to buy; then they could complete and record the sale on the blockchain.

Using this process, they could transfer the property deed without manually submitting paperwork to update the local county’s government records; it would be instantaneously updated in the blockchain.

Smart Contracts

Another blockchain innovation are self-executing contracts commonly called “smart contracts.” These digital contracts are enacted automatically once conditions are met. For instance, a payment for a good might be released instantly once the buyer and seller have met all specified parameters for a deal.

“We see great potential in the area of smart contracts—using blockchain technology and coded instructions to automate legal contracts,” says Gray. “A properly coded smart legal contract on a distributed ledger can minimize, or preferably eliminate, the need for outside third parties to verify performance.”

Supply Chain Monitoring

Supply chains involve massive amounts of information, especially as goods go from one part of the world to the other. With traditional data storage methods, it can be hard to trace the source of problems, like which vendor poor-quality goods came from. Storing this information on blockchain would make it easier to go back and monitor the supply chain, such as with IBM’s Food Trust, which uses blockchain technology to track food from its harvest to its consumption.

Voting

Experts are looking into ways to apply blockchain to prevent fraud in voting. In theory, blockchain voting would allow people to submit votes that couldn’t be tampered with as well as would remove the need to have people manually collect and verify paper ballots.

Advantages of Blockchain

Higher Accuracy of Transactions

Because a blockchain transaction must be verified by multiple nodes, this can reduce error. If one node has a mistake in the database, the others would see it's different and catch the error.

In contrast, in a traditional database, if someone makes a mistake, it may be more likely to go through. In addition, every asset is individually identified and tracked on the blockchain ledger, so there is no chance of double spending it (like a person overdrawing their bank account, thereby spending money twice).

No Need for Intermediaries

Using blockchain, two parties in a transaction can confirm and complete something without working through a third party. This saves time as well as the cost of paying for an intermediary like a bank.

“It has the ability to bring greater efficiency to all digital commerce, to increase financial empowerment to the unbanked or underbanked populations of the world and to power a new generation of internet applications as a result,” says Shtylman.

Extra Security

Theoretically, a decentralized network, like blockchain, makes it nearly impossible for someone to make fraudulent transactions. To enter in forged transactions, they would need to hack every node and change every ledger. While this isn't necessarily impossible, many cryptocurrency blockchain systems use proof-of-stake or proof-of-work transaction verification methods that make it difficult, as well as not in participants' best interests, to add fraudulent transactions.

More Efficient Transfers

Since blockchains operate 24/7, people can make more efficient financial and asset transfers, especially internationally. They don't need to wait days for a bank or a government agency to manually confirm everything.

Disadvantages of Blockchain

Limit on Transactions per Second

Given that blockchain depends on a larger network to approve transactions, there's a limit to how quickly it can move. For example, Bitcoin can only process 4.6 transactions per second versus 1,700 per second with Visa. In addition, increasing numbers of transactions can create network speed issues. Until this improves, scalability is a challenge.

High Energy Costs

Having all the nodes working to verify transactions takes significantly more electricity than a single database or spreadsheet. Not only does this make blockchain-based transactions more expensive, but it also creates a [large carbon burden](#) on the environment.

Because of this, some industry leaders are beginning to move away from certain blockchain technologies, like Bitcoin: For instance, Elon Musk recently said Tesla would stop accepting Bitcoin partly because he was concerned about the damage to the environment.

Risk of Asset Loss

Some digital assets are secured using a cryptographic key, like [cryptocurrency](#) in a blockchain wallet. You need to carefully guard this key.

“If the owner of a digital asset loses the private cryptographic key that gives them access to their asset, currently there is no way to recover it—the asset is

gone permanently,” says Gray. Because the system is decentralized, you can’t call a central authority, like your bank, to ask to regain access.

Potential for Illegal Activity

Blockchain’s decentralization adds more privacy and confidentiality, which unfortunately makes it appealing to criminals. It’s harder to track illicit transactions on blockchain than through bank transactions that are tied to a name.

How to Invest in Blockchain

You can’t actually invest in blockchain itself, since it’s merely a system for storing and processing transactions. However, you can invest in assets and companies using this technology.

“The easiest way is to purchase cryptocurrencies, like Bitcoin, Ethereum and other tokens that run on a blockchain,” says Gray.

Another option is to invest in blockchain companies using this technology. For example, Santander Bank is experimenting with blockchain-based financial products, and if you were interested in gaining exposure to blockchain technology in your portfolio, you might buy its stock.

For a more diversified approach, you could buy into an exchange-traded fund ([ETF](#)) that invests in blockchain assets and companies, like the Amplify Transformational Data Sharing ETF (BLOK), which puts at least 80% of its assets in blockchain companies.

The Bottom Line

Despite its promise, blockchain remains something of a niche technology. Gray sees the potential for blockchain being used in more situations but it

depends on future government policies. “It remains to be seen when and if regulators like the SEC will take action. One thing is evident—the goal will be to protect markets and investors,” he says.

Shtylman likens blockchain to the early stages of the internet. “It took about 15 years of having the internet before we saw the first version of Google and over 20 for Facebook. It’s hard to predict where blockchain technology will be in another 10 or 15 years, but much like the internet, it will significantly transform the ways we transact and interact with each other in the future.”

Hurdles remain, especially with the transaction limits and energy costs, but for investors who see the potential of the technology, blockchain-based investments may be a bet worth taking.